Extracting Individual Tracks from Polyphonic Music
Computer Systems Lab, 2008-2009
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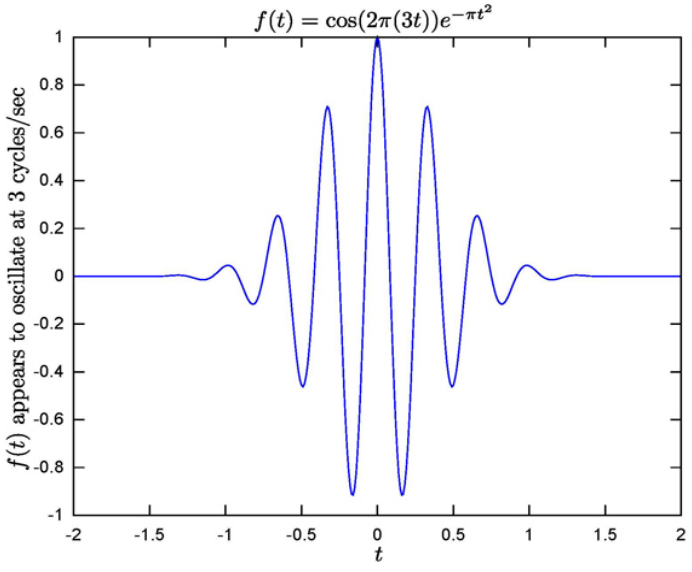
Abstract

For this project, a method is developed for the isolation of individual musical tracks from polyphonic tracks based on certain criteria, such as trying to select a specific instrument. The heart of the algorithm is the use of Independent Component Analysis to separate the tracks, after which the components are to be grouped into subspaces depending on the criteria desired and recombined to put them back in a listenable format.

Results

Unfortunately, the scope of this project proved to be too great for a year-long high school project. Numerous technical issues and setbacks prevented the project from fully taking form, but a lot of useful functionality was still written and it would be a solid start to further research.



$$F(\nu) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \nu} dx$$

The definition of a Fourier Transform

Background

This project is essentially a problem of source separation. Source separation problems occur when there are a set of observed signals that are a linear mixture of some pure "source" signals. In this case, the observed signals might be the L and R stereo channels of a recording, while the sources might be instruments. The same techniques can apply, however, to a topic as unrelated as medical imaging of the brain, to separate and eliminate magnetic field interference from unrelated devices.